

Amendment to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1-24. (cancelled)

25. (previously presented) The method of claim 29, wherein the surface comprises a two dimensional surface.

26. (original) The method of claim 25, wherein placing the two dimensional surface comprises:

casting a ray from an optical center, corresponding to the real-time video imagery information, to a bottom point of the moving region in an image plane in the three dimensional model; and

determining a position, an orientation and a size of the two dimensional surface based on the ray, a ground plane in the three dimensional model, and the moving region.

27-28. (cancelled)

29. (previously presented) A method comprising:

obtaining a three dimensional model of a three dimensional environment, the three dimensional model generated from range sensor information representing a height field for the three dimensional environment;

identifying in real time a region in motion with respect to a background image in real-time video imagery information from at least one image sensor having associated position and orientation information with respect to the three dimensional model, the background image comprising a single distribution background dynamically modeled from a time average of the real-time video imagery information;

placing a surface that corresponds to the moving region in the three dimensional model;

projecting the real-time video imagery information onto the three dimensional model, including the surface, based on the position and orientation information; and

visualizing the three dimensional model with the projected real-time video imagery;

wherein identifying a region in motion in real time comprises subtracting the background image from the real-time video imagery information, identifying a foreground object in the subtracted real-time video imagery information, validating the foreground object by correlation matching between identified

objects in neighboring image frames, and outputting the validated foreground object;

wherein identifying a foreground object comprises identifying the foreground object in the subtracted real-time video imagery information using a histogram-based threshold and a noise filter;

wherein identifying a region in motion in real time further comprises estimating the background image by modeling the background image as a temporal pixel average of five recent image frames in the real-time video imagery information.

30. (previously presented) The method of claim 29, further comprising tracking the position and orientation information of the at least one image sensor in the environment with respect to the three dimensional model in real-time.

31. (previously presented) The method of claim 30, wherein obtaining a three dimensional model of a three dimensional environment comprises generating the three dimensional model of the three dimensional environment.

32. (cancelled)

33. (previously presented) The system of claim 37, wherein the surface comprises a two dimensional surface.

34. (original) The system of claim 33, wherein the object detection and tracking component places the two dimensional surface by performing operations comprising:

casting a ray from an optical center, corresponding to the real-time video imagery information, to a bottom point of the moving region in an image plane in the three dimensional model; and

determining a position, an orientation and a size of the two dimensional surface based on the ray, a ground plane in the three dimensional model, and the moving region.

35-36. (cancelled)

37. (previously presented) An augmented virtual environment system comprising:

an object detection and tracking component that identifies in real time a region in motion with respect to a background image in real-time video imagery information from at least one image sensor having associated position and orientation information with respect to a three dimensional model of a three dimensional environment, the three dimensional

model generated from range sensor information representing a height field for the three dimensional environment, the background image comprising a single distribution background dynamically modeled from a time average of the real-time video imagery information, and places a surface that corresponds to the moving region with respect to the three dimensional model;

a dynamic fusion imagery projection component that projects the real-time video imagery information onto the three dimensional model, including the surface, based on the position and orientation information; and

a visualization sub-system that visualizes the three dimensional model with the projected real-time video imagery;

wherein the object detection and tracking component identifies the moving region by performing operations comprising subtracting the background image from the real-time video imagery information, identifying a foreground object in the subtracted real-time video imagery information, validating the foreground object by correlation matching between identified objects in neighboring image frames, and outputting the validated foreground object;

wherein identifying a foreground object comprises identifying the foreground object in the subtracted real-time video imagery information using a histogram-based threshold and a noise filter; and

wherein identifying a region in motion in real time further comprises estimating the background image by modeling the background image as a temporal pixel average of five recent image frames in the real-time video imagery information.

38. (previously presented) The system of claim 37, further comprising a tracking sensor system that integrates visual input, global navigational satellite system receiver input, and inertial orientation sensor input to obtain the position and the orientation information associated with the at least one image sensor in real time in conjunction with the real-time video imagery.

39. (previously presented) The system of claim 38, further comprising a model construction component that generates the three dimensional model of the three dimensional environment.

40-49. (cancelled)